polygon, but will be suitable for stabilizing the heart adjacent to an anastomosis site to enable anastomosis of a graft vessel to a coronary artery. The foot may have a friction-enhancing surface to improve grip and minimize migration on the epicardium, which may be textured, knurled, roughened, or covered or coated with a friction-enhancing material. In a preferred embodiment, the foot is attached to the shaft by an articulating joint which may be locked and unlocked by means of an actuator coupled to the proximal end of the shaft. This allows the foot to be positioned at various orientations relative to the shaft according to the angle of approach and the location of the anastomosis site on the heart.

The stabilizer may optionally include one or more retainers which can be used for placement of sutures or silastics during an anastomosis or other procedure. The retainers are preferably located on the foot itself for proximity to the surgical site. The retainers are configured to retain the sutures or silastics in a state of tension, and have a clamping mechanism or are dimensioned for frictional engagement with the suture or silastic. In some embodiments, the retainers are removably attached to the stabilizer foot to allow the retainers to be removed when not needed or to be disposed of following the procedure.

The stabilizer is coupled to a mounting base which attaches to the rails of the retractor. The mounting base preferably includes at least two movable joints between the point of attachment to the rail and the point of attachment to the stabilizer, each joint having at least two axes of rotation. Preferably, the joints are spherical joints or ball-in-socket joints, thus maximizing the number of degrees of freedom available for positioning the stabilizer. The mounting base includes a coupling which attaches to the retractor rails, allows sliding movement thereon, and has a locking mechanism for locking the mounting base in a selected position on the rail.

The system may include a variety of other components and accessories useful in heart surgery. These include a heart retractor, which has a shaft, preferably malleable, and a paddle for engaging the heart. The paddle is preferably coated with a gauze or other atraumatic, friction-enhancing material to improve grip on the surface of the heart so as to facilitate rolling or lifting the heart. The system may also include a CO2 blower for emitting gas at the anastomosis site so as to keep it dry, clear of fluid and debris and thus visible to the surgeon. The blower preferably attaches to or is integrated into the stabilizer to facilitate positioning the blower outlet near the

anastomosis site. A vascular clamp may also be provided which attaches to the rails of the retractor. The clamp may be used to temporarily clamp the end of a graft vessel such as the internal mammary artery and to hold it out of the surgical field until the surgeon is ready to use it. Various other devices may also be attached to the rails or other components of the system, including lighting, irrigation, suture retention, and retraction devices, as well as catheters and surgical instruments.

Referring now to the figures, Figure 1 illustrates a first embodiment of a system for performing heart surgery according to the invention. The system includes a retractor 20 having a crossbeam 22, a stationary arm 24, and a movable arm 26. Stationary arm 24 and movable arm 26 have rails 28, 29 disposed along the top surface thereof, rails 28, 29 being defined by a pair of opposing side channels 30 forming a pair of lips 32 along the outer and inner upper edges of arms 24, 26. Stationary arm 24 and movable arm 26 further include wings 34, 36 extending outwardly from the lateral sides thereof. A plurality of channels 37 extend transversely across the top surfaces of stationary arm 24 and movable arm 26 and are dimensioned and configured for receiving a suture therein for retraction of the pericardium or other tissues, as described more fully below.

Movable arm 24 is attached to a carriage 38 slidably mounted to crossbeam 22. A key 40 is rotatably mounted to carriage 38 and is coupled to a pinion gear (described below) which engages a rack (described below) on crossbeam 22. In this way, movable arm 26 is movable toward and away from stationary arm 24 by rotating key 40. While stationary arm 24 is preferably mounted to crossbeam 22 so as to be unmovable, in some embodiments, both arms may be movably mounted to crossbeam 22 in the manner described above or in any other suitable manner. Crossbeam 22 further includes a pair of side channels 42 on its front and back edges each defining an upper lip 44 and a lower lip 46, thus forming a rail similar in construction to rails 28, 29 on stationary arm 24 and movable arm 26.

Referring to Figure 2, the back edge of crossbeam 22 forms a rack 48 having a plurality of linearly arranged gear teeth 50. Key 40 is coupled to a pinion gear 52 (shown in phantom) which engages rack 48, thus enabling movement of movable arm 26 by rotation of key 40. Side channel 42 extends longitudinally through rack 48, thus forming two parallel rows of gear teeth 50.

Referring again to Figure 1, a first blade 52 is attached to stationary arm 24 and a second blade 54 is attached to movable arm 26. Preferably, first and second blades 52, 54 are removably coupled to arms 24, 26 to allow removal and interchange of various blades. As shown in Figure 3, in which stationary blade 24 and movable blade 26 are shown removed from crossbeam 22 for clarity, first and second blades 52, 54 each have a pair of pins 56 which are slidably received in holes 58 in stationary arm 24 and movable arm 26. In this way, blades of various sizes and shapes may be easily interchanged according to the particular patient and procedure in which the device is being utilized. Blades 52, 54 have outwardly facing surfaces 55, 57 configured to atraumatically engage tissue or bone for retraction thereof.

In a preferred embodiment, crossbeam 22, stationary arm 24, movable arm 26, and first and second blades 52, 54 are all made of a biocompatible and sterilizable metal such as stainless steel, aluminum or titanium to allow resterilization and reuse after each procedure. However, it should be noted that any of these components may be made of an inexpensive material suitable for mass production, such as plastic, so that such components may be disposed of after a single use. In another exemplary embodiment, crossbeam 22 is metal so as to be reusable, while arms 24, 26 are plastic for single use and are removably attached to crossbeam 22 and carriage 38, respectively. Alternatively, crossbeam 22 and arms 24, 26 may be a reusable metal, while blades 52, 54 are a disposable plastic for single use.

Also shown in Figure 3 are recesses 60 in the top surfaces of stationary arm 24 and movable arm 26 which are configured to receive suture stays 62. Suture stays 62 include a body 64 shaped for insertion into recess 60 and a plurality of slots 66 which align with channels 37 in arms 24, 26. As shown in Figures 4A-B, a clamp 61 is coupled to body 64 adjacent to each slot 66 and is configured to engage and retain a suture thread within slot 66. In an exemplary embodiment, each clamp 61 comprises a leaf 63 extending from a post 65. On the bottom side of body 62, an aperture 67 is disposed generally transverse to each slot 66 and has a bore 69 adjacent thereto. Posts 65 fit into bores 69, and leaves 63 are deflected so as to fit into apertures 67. In this way, leaves 63 are pre-loaded and biased into a clamping position in which their outer edges 71 are in engagement with the walls of slots 66. Outer edges 71 are deflectable in the direction of arrows 73 to allow a suture to be drawn into slots 66, but are biased back into engagement with the suture to clamp it in place.